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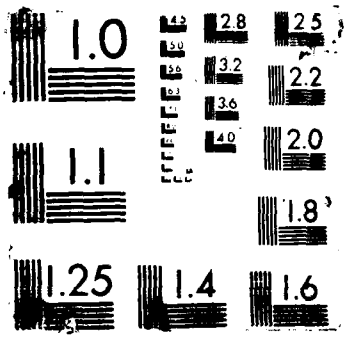
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RELATIVE ABUNDANCE AND SEASONAL AND GEOGRAPHIC DISTRIBUTION OF *COQUILLETTIDIA PERTURBANS* (WALKER) COLLECTED WITH LIGHT TRAPS FROM USAF INSTALLATIONS IN THE CONTINENTAL UNITED STATES, 1971 - 1985

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May 1988

Interim Report for Period 1971 - 1985

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USAF SCHOOL OF AEROSPACE MEDICINE
Human Systems Division (AFSC)
Brooks Air Force Base, TX 78235-5301

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NOTICES

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The Office of Public Affairs has reviewed this report and it is releasable to the National Technical Information Service, where it will be available to the general public, including foreign nationals.

This report has been reviewed and is approved for publication.

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Data from the U.S. Air Force School of Aerospace Medicine, Medical Entomology Function's mosquito surveillance and identification program at Brooks Air Force Base, TX, were reviewed for the 15-year period of 1971-1985 for the pest mosquito, Coquillettidia perturbans, to assess nationwide seasonal and geographic distribution patterns as well as relative abundance. The 15-year total of 31,279 Cq. perturbans was received in weekly or biweekly submissions for identification from 60 USAF installations nationwide. Distribution patterns and relative abundance data are presented and discussed. Keywords: collecting methods; [illegible] trapping; light traps; etc.)

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RELATIVE ABUNDANCE AND SEASONAL AND GEOGRAPHIC DISTRIBUTION OF COQUILLETTIDIA PERTURBANS (WALKER) COLLECTED WITH LIGHT TRAPS FROM USAF INSTALLATIONS IN THE CONTINENTAL UNITED STATES, 1971-1985

INTRODUCTION

Coquillettidia perturbans (Fig. 1) is the only species of mosquito in the genus Coquillettidia in North America, and although both Mansonia and Coquillettidia have similar distinctive broad wing scales, the latter can be separated from Mansonia by the lack of spiracular setae. Carpenter and LaCasse (1) reported the distribution of this species to include most of the United States, southern Canada, and Mexico. It is quite common in the East and constitutes an important pest in communities near shallow lakes containing emergent aquatic vegetation. Female Cq. perturbans bite principally at dusk, but may also bite during the afternoon in shady areas.

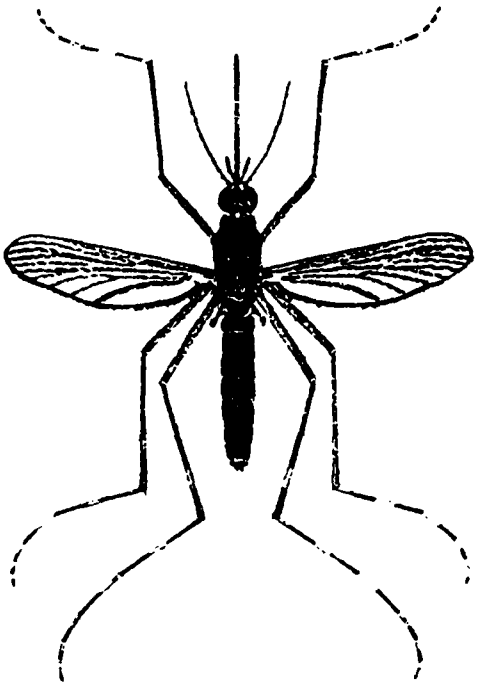

Figure 1. Adult female Coquillettidia perturbans (Redrawn from Carpenter and LaCasse, Mosquitoes of North America, 1955).

As for its vector potential, Howitt et al. (2) recovered the virus of Eastern Equine Encephalitis (EEE) from wild-caught specimens in Georgia. Laboratory studies have shown the infection rate and guinea pig transmission rate of EEE virus to be 83% and 28%, respectively (3). The U.S. Air Force (USAF) has conducted a mosquito surveillance program at approximately 88 installations throughout the United States for 16 years. As part of this program, geographic and seasonal distribution as well as relative abundance data are compiled annually for mosquito species by Air Force base for all participating installations. The objective of this study was to analyze such data for the pest mosquito, Coquillettidia perturbans, on a nationwide scale over a 15-year period.

MATERIALS AND METHODS

The USAF mosquito surveillance program involves weekly or biweekly light-trap collections throughout the mosquito season at several sites on each installation. Mosquitoes are subsequently carefully packaged and sent to the Medical Entomology Section, Epidemiology Division, USAF School of Aerospace Medicine (USAFSAM), Brooks AFB, Texas, for identification. The Medical Entomology Section is ordinarily staffed with one to three Ph.D. entomologists who confirm the identifications of two or more mosquito identifiers. In addition, voucher specimens of many species, confirmed by the United States National Museum or other sources, are available for reference.

Light traps used in the surveillance program have varied throughout the 15-year period. During the early 1970s all participating installations used New Jersey light traps (Fig. 2) with or without dry ice (their choice) as an attractant. In the mid-1970s USAF bases began using CDC miniature light traps (Fig. 3, Sudia and Chamberlain (4)) both with and without dry ice. In the early 1980s some installations chose to use the solid-state Army miniature light traps (Fig. 4), again both with and without dry ice. Until computerization of program results began in the early 1980s, all light-trap data were lumped together without reference to trap type or use of CO_2. Therefore, these data will not be differentiated as to mosquito-trap type. Analysis of the data is straightforward and self-explanatory with one exception: to determine average month of initial collection of Cq. perturbans and the

month of peak numbers at each base, numerical values corresponding to the months were averaged. If there was no peak month for a particular year, then shared peak months were averaged.

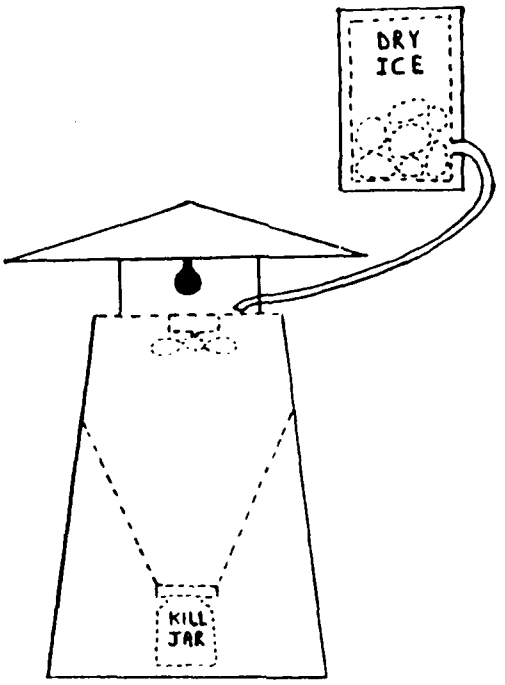

Figure 2. New Jersey light trap (with CO_2).

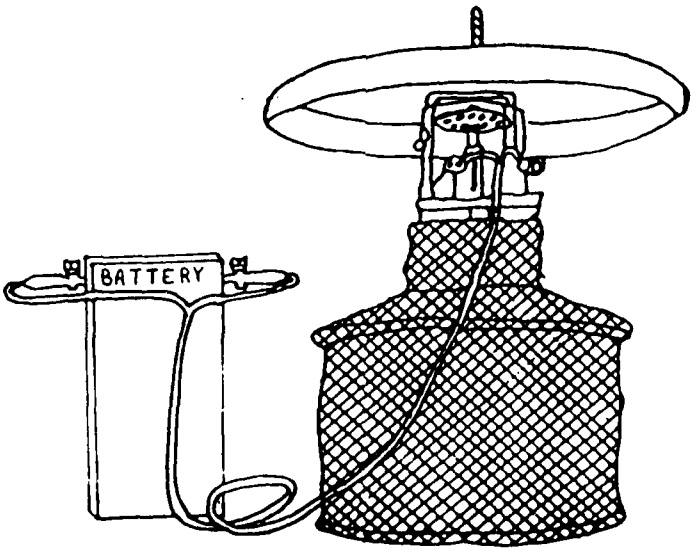

Figure 3. CDC miniature light trap.

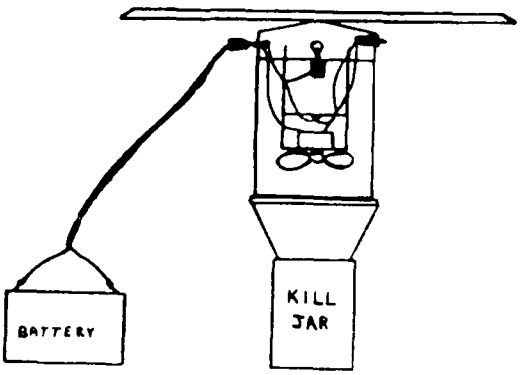

Figure 4. Solid-state Army miniature light trap.

RESULTS AND DISCUSSION

A total of 31,279 Coquillettidia perturbans were collected by light trap from 1971 to 1985 at 60 USAF installations throughout the United States. However, of the bases submitting mosquitoes, seven (12%) submitted 23,900 (76%) of the Cq. perturbans. The installations collecting the most specimens were in Georgia, Florida, and New York. On the other hand, one-third (28/88) of the bases submitting mosquitoes for identification failed to collect any Cq. perturbans. Although Cq. perturbans were collected west of the Mississippi River in this study, numbers were relatively low. The fact that only 10 specimens (out of over 3,000 collections) were collected over a 15-year period in California suggests that the species is relatively uncommon in that state. This fact supports the findings of Bohart and Washino (5), who reported Cq. perturbans to be of little importance in disease transmission in California due to its relative rarity.

The geographic distribution of Cq. perturbans based upon our data (Fig. 5) closely agrees with that of Darsie and Ward (6) with two exceptions: our records show 107 Cq. perturbans collected at Mountain Home AFB, Idaho, which is located 250 miles southwest of the distribution shown by Darsie and Ward (6). Second, we have records of 3 specimens (from two different collections 5 years apart) submitted by Holloman AFB, New Mexico, which is also located 250 miles west of the reported distribution of this species. These records differ from prior reports (6, 7) but cannot be substantiated without voucher specimens.

Nationwide, specimens of Cq. perturbans were more commonly collected in the East and Southeast, and were taken from March through October. Light-trap collections of this species were most often made in June and July with peak numbers of specimens at each base occurring a month or so after the initial collection (Table 1). In the far northern bases (North Dakota, Michigan, and New York), the month of initial collection was sometimes as late as August. Our seasonal data basically agree with that of other studies. Harden and Poolson (8) reported an initial collection of Cq. perturbans in April for Mississippi with peak numbers occurring in May, whereas in New York, Cq. perturbans first appeared in May with a peak in July (9).

As a general trend, the initial collections and peak months for Cq. perturbans occurred earlier in the season toward the South and Southeast. This pattern would be expected with the shorter and milder winters in the South. However, there were exceptions to this trend; for example, a base in Arkansas showed an average initial collection date of late July, and a Delaware base showed the same to be mid-May. Also, the southernmost installations actually did not show the earliest initial collection (Georgia and South Carolina did). This inconsistency may not be due to actual emergence of Cq. perturbans but rather a function of absolute numbers related to trapping inefficiencies, numbers of traps, trap site selection, use of CO_2, etc.

It has been previously shown in studies comparing light traps and suction traps that light traps may give false indications of actual population numbers of Cq. perturbans (10). Moreover, Ashton and Rabalais (11) reported that CDC traps containing dry ice as an attractant collected more Cq. perturbans than New Jersey traps. Therefore, data obtained in our study are somewhat limited by trap differences in the ability to attract this species. However, these data, limited as they may be by trap variations, indicate the widespread geographic distribution of Cq. perturbans in the United States, their apparent high population densities in the East and Southeast, and their light-trap collections occurring most commonly in June or July. Nationwide, 15-year activity patterns of Cq. perturbans may prove valuable in our understanding of the bionomics of the species as well as in future predictive studies.

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We thank all the USAF medical entomologists and entomology technicians who worked at the USAFSAM Epidemiology Division during 1971-1985 and contributed to the data base used in this study. Lt Col Jerry Lang, Headquarters, Military Airlift Command, Scott AFB, Illinois, was the USAF medical entomologist primarily responsible for computerizing the mosquito surveillance program. Thanks are also extended to Pat Miller for preparing the manuscript.

REFERENCES

1. Carpenter, S.J., and W.J. LaCasse. Mosquitoes of North America. University of California Press, Berkeley, 1955.

2. Howitt, B.F., H.R. Dodge, L.K. Bishop and R.H. Gorrie. Recovery of the virus of eastern equine encephalomyelitis from mosquitoes (Mansonia perturbans) collected in Georgia. Science 110:141-142 (1949).

3. Chamberlain, R.W., R.E. Kissling, D.D. Stamm, D.B. Nelson and R.K. Siles. Venezuelan equine encephalitis in wild birds. Am J Hyg 63:261-273 (1956).

4. Sudia W.D., and R.W. Chamberlain. Battery operated light trap, an improved model. Mosq News 22:126-129 (1962).

5. Bohart, R.M., and R.K. Washino. Mosquitoes of California. University of California, Division of Agricultural Science Publication #4084, 1978.

6. Darsie, R.F., and R.A. Ward. Identification and geographical distribution of the mosquitoes of North America, North of Mexico. Mosq Syst Supplement 1:1-313 (1981).

7. McNeel, T.E., and F.F. Fergusen. Mosquito distribution and abundance in Arkansas-White-Red River basins. Pub Hlth Rep 69:385-390 (1954).

8. Harden, F.W., and B.J. Poolson. Seasonal distribution of mosquitoes of Hancock County, Mississippi, 1964-1968. Mosq News 29:407-414 (1969).

9. Woodard, A.G. Results of systematic trapping of the mosquito populations in Saratoga County, N.Y. Mosq News 40:641-643 (1980).

10. Muirhead-Thompson, E.C. Behavior patterns of blood sucking flies. Pergamon Press, Oxford, 1982.

11. Ashton, A.D., and F.C. Rabalais. A survey of mosquitoes in Wood County, Ohio. Mosq News 37:767-770 (1977).

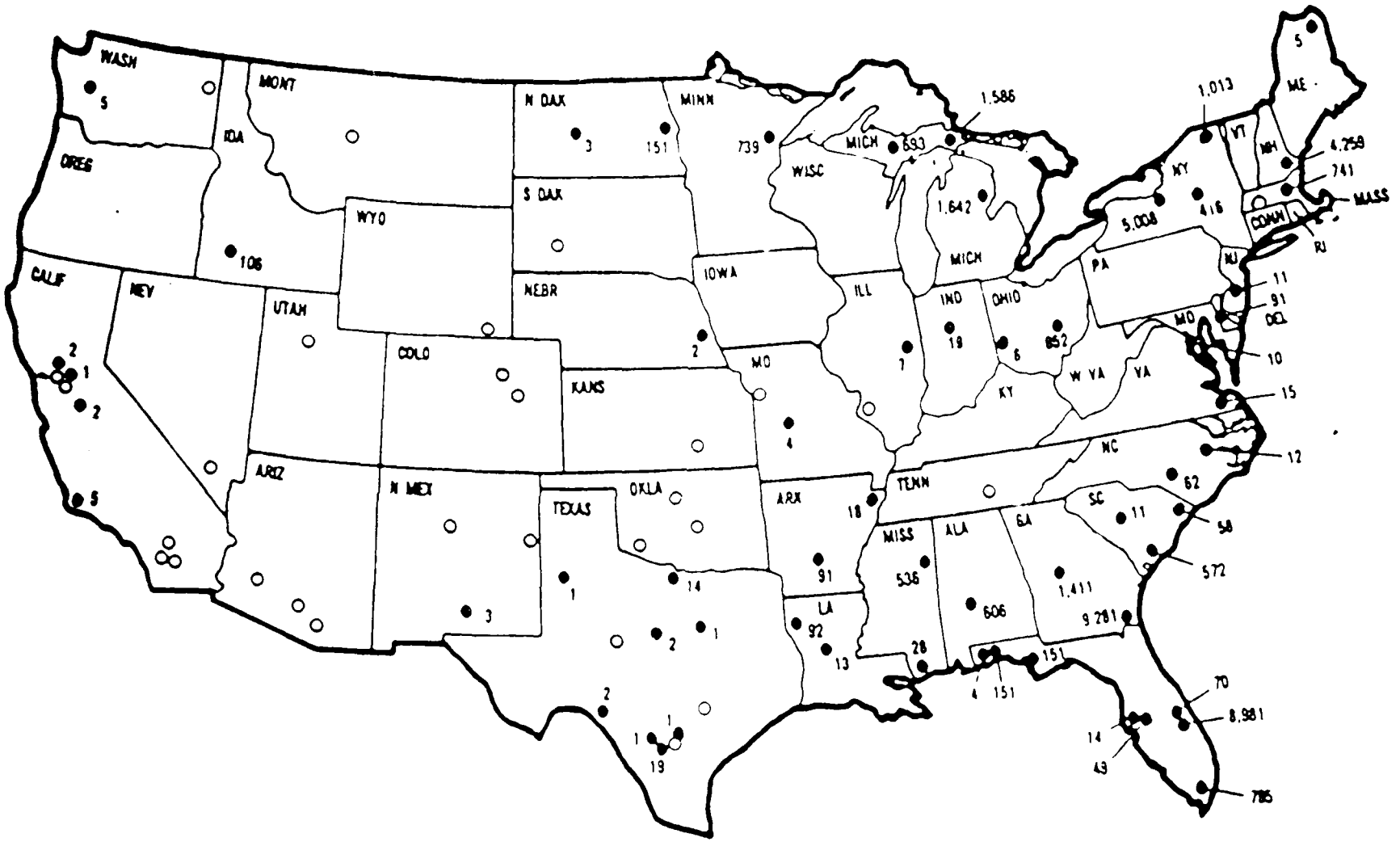

Figure 5. Nationwide geographic distribution of Coquillettidia perturbans as indicated by light-trap collections at USAF installations. ○ = bases submitting mosquitoes; ● = those collections that included C. perturbans. Numbers indicate 15-year totals.

TABLE 1. SEASONAL DISTRIBUTION OF COQUILLETTIDIA PERTURBANS AT PARTICIPATING USAF INSTALLATIONS[1,2]
(Month of initial collection (IC) and peak month (PM) ranked by state, south to north).

AF BASE	1971 IC/PM	1972 IC/PM	1973 IC/PM	1974 IC/PM	1975 IC/PM	1976 IC/PM	1977 IC/PM	1978 IC/PM	1979 IC/PM	1980 IC/PM	1981 IC/PM	1982 IC/PM	1983 IC/PM	1984 IC/PM	1985 IC/PM	15-yr avg[2] TC	PM
Homestead, FL	NC[3]	NC	[illegible]	NC	NC	NC	NC	7/9	5/5	5/9	6/6	5/10	5/5	5/6	6/9	5.5	7.4
Kennedy, FL	NC	NC	[illegible]	NC	NC	NC	NC	NC	NC	5/6	NC	NC	5/5	5/7	5/6	5.0	6.0
Patrick, FL	6/6	NC	NC	7/7	NC	7/7	NC	NC	7/8.5[4]	NC	NC	5/5	8/8	NC	6/7	6.5	6.9
MacDill, FL	NC	NC	NC	NC	NC	7/7	NC	NC	NC	NC	NC	NC	NC	4/7	4/4	5.0	6.0
Avon Park, FL	NC	NC	NC	NC	NC	NC	NC	NC	6/7	7/7	9/9	NC	NC	5/5.5[4]	9/9	7.2	7.5
Tyndall, FL	NC	5/5	4/8	5/5	NC	NC	6/6.5[4]	NC	NC	NC	5/5	4/9	5/5	5/6	NC	4.9	6.2
Eglin, FL	5/9	6/7.3[4]	4/6.3[4]	5/5	NC	NC	NC	9/9	4/5	5/8	4/7	9/9	5/5	5/5	9/9	5.8	7.0
Hurlburt Field, FL	NC	5/6	7/7	NC	8/8	NC	7/7	NC	NC	NC	NC	NC	NC	NC	NC	7.0	7.0
Moody, GA	NC	7/7	5/6	5/5	6/7.5[4]	5/6	4/5	4/5	4/5	4/5	5/5	4/9	5/5	5/5	NC	4.8	5.8
Robins, GA	NC	NC	[illegible]	5/9	4/5	3/6	8/8	5/8	5/9	5/6	5/9	4/9	5/5	6/7	4/5	5.0	7.2
Charleston, SC	NC	NC	[illegible]	NC	NC	NC	4/4	5/7	4/5	5/5	4/5	5/5	6/6	4/8	5/5	4.6	5.6
Myrtle Beach, SC	NC	NC	NC	6/6	NC	NC	5/5	NC	7/7	NC	NC	5/5	NC	NC	NC	5.7	5.8
Maxwell, AL	NC	NC	NC	NC	NC	8/8	NC	5/5	6/8	5/9	5/5	5/6	NC	6/9	NC	5.7	7.1
Keesler, MS	NC	NC	NC	4/9	5/5	NC	NC	NC	5/5	7/7	6/6	5/5	NC	NC	NC	5.3	6.2
Columbus, MS	6/6	6/6	5/5	5/5	5/5	6/6	4/5	NC	5/5	5/5	5/5	5/6	5/5	5/6	5/6	5.1	5.4
Barksdale, LA	5/6	9/9	NC	NC	6/8	5/6	5/9	NC	5/5	9/9	6/6	NC	NC	NC	7/7	6.3	7.2
Little Rock, AR	6/6	NC	6/6	NC	6/6	7/9	5/5	5/5	5/5	5/5	NC	NC	6/8	5/6	5/6	5.5	6.0
Blytheville, AR	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	6/6	8/8	NC	9/9	NC	7.6	7.7
Sheppard, TX	8/8	NC	NC	NC	NC	8/8	NC	NC	NC	6/6	6/6	NC	NC	NC	NC	7.0	7.0
Chanute, IL	NC	NC	NC	NC	NC	NC	NC	NC	7/7	NC	7/7	6/6	NC	NC	NC	6.6	6.6
Dover, DE	NC	NC	NC	NC	NC	6/6	NC	NC	5/8	5/5	6/6	NC	NC	NC	NC	5.5	6.3
Grissom, IN	NC	NC	NC	7/7	NC	NC	NC	NC	7/7	6/7	7/7	6/7	8/8	7/7	7/7	6.8	7.1
Westover, MA	NC	NC	NC	NC	NC	NC	NC	NC	7/7	6/6	NC	6/6	NC	NC	NC	6.5	6.5
Hanscom, MA	7/7	7/9	6/7	6/7	7/7	9/9	NC	7/7.5[4]	6/7	8/8	NC	NC	6/7	6/7	5/7	6.8	7.5
Pease, NH	7/8	7/8	6/7	NC	6/7	6/6	5/7	NC	6/7	6/6	6/6	NC	6/7	6/7	6/7	6.1	6.9
Hancock Field, NY	7/8	8/8.5[4]	6/6	6/7	6/7	6/6	NC	6/7	6/7	6/6	6/6	6/6	7/8	NC	NC	6.3	6.9
Griffis, NY	6/6.5[4]	NC	6/7	7/7	6/7	NC	NC	NC	7/7	7/7	6/7	NC	6/7	7/7	6/6	6.4	6.9
Plattsburg, NY	6/7	6/7	6/8	NC	6/7	7/7	NC	5/7	6/7	8/8	NC	NC	NC	6/7	6/6	6.2	7.0
Wurtsmith, MI	NC	7/8	7/8	6/7	6/6	6/7	NC	6/6	7/7.5[4]	7/7	6/6	7/7	7/7	7/7	7/7	6.6	7.0
K I Sawyer, MI	7/7.5[4]	7/8	NC	7/7	NC	NC	NC	NC	7/7	6/6.5[4]	NC	NC	7/7	7/7	7/7	6.9	7.1
Kinchloe, MI	NC	7/7	6/7	6/7	5/6	8/8	NC	NC	NC	NC	NC	NC	NC	NC	NC	6.4	7.0
Deluth, MN	NC	8/8	7/7	7/7	6/7	5/8	NC	6/8	NC	NC	NC	NC	NC	NC	NC	6.5	7.5
Grand Forks, ND	NC	NC	7/7	NC	NC	NC	NC	NC	NC	6/7	NC	7/7	7/7	7/7	NC	6.8	7.0
Minot, ND	NC	8/8	NC	8/8	NC	NC	NC	NC	NC	8/8	NC	NC	NC	NC	NC	8.0	8.0
McChord, WA	NC	NC	NC	NC	NC	8/8	8/8	NC	NC	NC	7/7	NC	NC	NC	NC	7.6	7.6

[1]Only installations with 3 or more years of submitting C. perturbans were included.
[2]Calculated by averaging numerical values of months.
[3]NC = None collected.
[4]Shared peak months.

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